



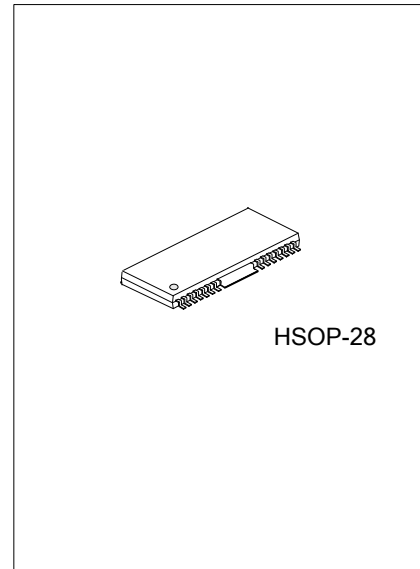
## UA8954

## LINEAR INTEGRATED CIRCUIT

### 4 CHANNEL BTL DRIVER FOR CD/CD-ROM

#### FEATURES

- \* Wide dynamic range, (4.0V (typ.) at PreVcc=12V, PVcc=5V, RL=8Ω)
- \* Level shift circuit built in.
- \* Thermal-shut-down circuit built in.
- \* UTC **UA8954** is a 4 channel driver for optical disc motor driver. Dual channel current feedback type drivers are built in, in addition to dual channel motor drivers.
- \* Stand-by mode built in.
- \* Separating Vcc into Pre+Power of sled motor, Power of loading motor and Power of actuator, can make better power efficiency, by low supply voltage drive.



#### <Actuator driver>

Current phase lag influenced load inductance is little, because this type is current feedback.

#### <Sled motor driver>

Input pins consist of (+) and (-), therefore various input types are available such as differential input.

#### <Loading driver>

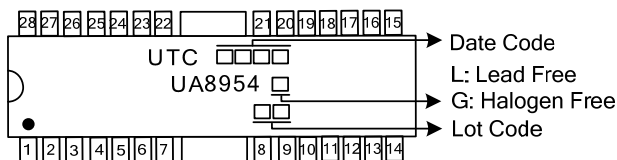
This is a single input linear BTL driver.

#### ORDERING INFORMATION

| Ordering Number |               | Package | Packing |
|-----------------|---------------|---------|---------|
| Lead Free       | Halogen Free  |         |         |
| UA8954L-SH1-T   | UA8954G-SH1-T | HSOP-28 | Tube    |

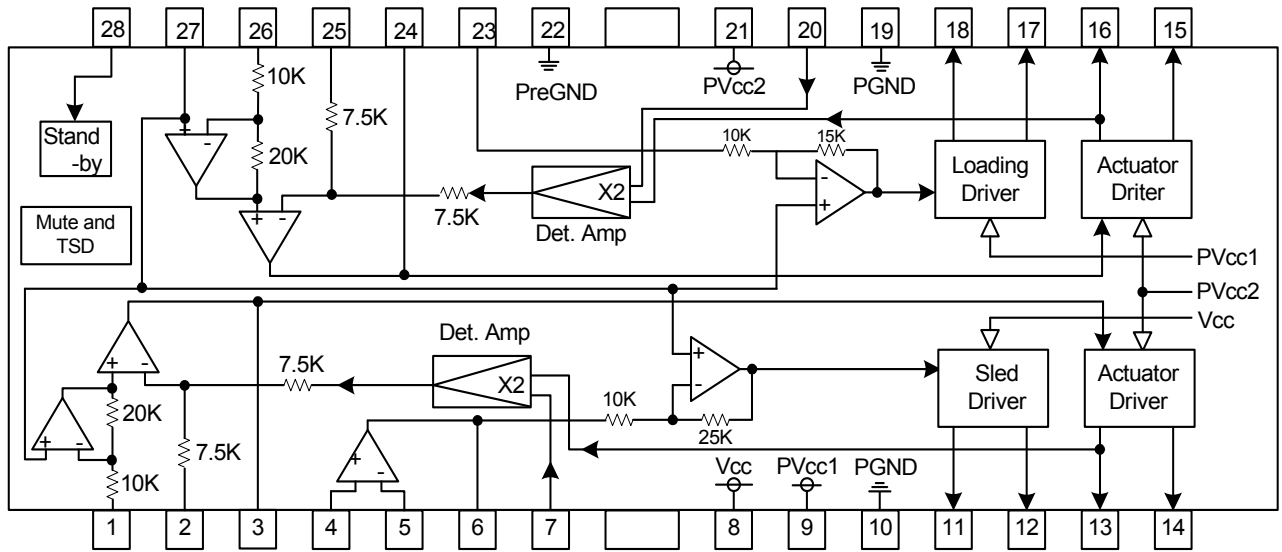
|   |  |
|---|--|
| <p>UA8954G-SH1-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> | <p>(1) R: Tape Reel</p> <p>(2) SH1: HSOP-28</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|--|

#### MARKING





### ■ BLOCK DIAGRAM



FLYING 汎翔國際有限公司  
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### ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER             | SYMBOL                | RATINGS      | UNIT |
|-----------------------|-----------------------|--------------|------|
| Supply Voltage        | $V_{CC}, P V_{CC1/2}$ | 13.5         | V    |
| Power Dissipation     | $P_D$                 | 1.7 (Note 2) | W    |
| Operating Temperature | $T_{OPR}$             | -20 ~ +85    | °C   |
| Storage Temperature   | $T_{STG}$             | -65 ~ +125   | °C   |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.  
 2. On less than 3% (percentage occupied by copper foil),  $70 \times 70 \text{mm}^2$ ,  $t=1.6 \text{mm}$ , glass epoxy mounting. Reduce power by 13.6mW for each degree above 25°C.

### ■ GUARANTEED OPERATING RANGES

( $T_A=25^\circ\text{C}$ ,  $V_{CC}=5\text{V}$ ,  $I_D=10\text{mA}$ ,  $R_{CAL}=33\text{K}\Omega$ , unless otherwise specified)

| PARAMETER      | SYMBOL      | RATINGS        | UNIT |
|----------------|-------------|----------------|------|
| Supply Voltage | $V_{CC}$    | 4.3 ~ 13.2     | V    |
|                | $P V_{CC1}$ | 4.3 ~ $V_{CC}$ |      |
|                | $P V_{CC2}$ | 4.3 ~ $V_{CC}$ |      |

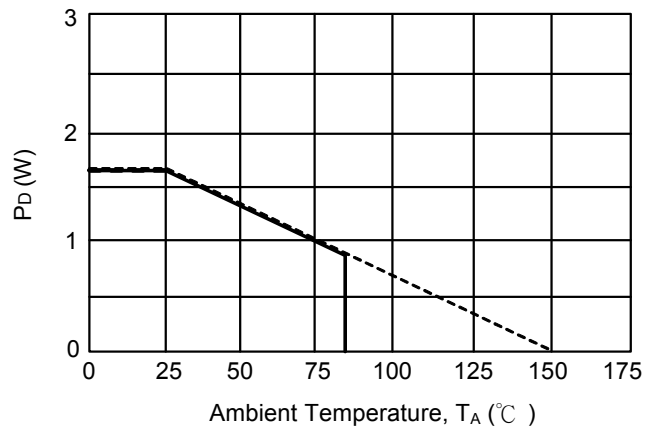
### ■ ELECTRICAL CHARACTERISTICS

( $T_A=25^\circ\text{C}$ ,  $V_{CC}=12\text{V}$ ,  $P V_{CC1}=P V_{CC2}=5\text{V}$ ,  $\text{BIAS}=2.5\text{V}$ ,  $R_L=8\Omega$ ,  $R_d=0.5\Omega$ ,  $C=100\text{pF}$ , unless otherwise specified)

| PARAMETER                           | SYMBOL           | TEST CONDITIONS                        | MIN  | TYP  | MAX  | UNIT |
|-------------------------------------|------------------|--|------|------|------|------|
| Quiescent current                   | $I_{CC}$         |  |      | 18   | 27   | mA   |
| Stand-by quiescent current          | $I_{ST}$         |  |      |      | 0.5  | mA   |
| Voltage for stand-by ON             | $V_{STON}$       |  |      |      | 0.5  | V    |
| Voltage for stand-by OFF            | $V_{STOFF}$      |  | 2.0  |      |      | V    |
| <b>Actuator driver</b>              |                  |  |      |      |      |      |
| Output offset current               | $I_{OO}$         |  | -6   |      | 6    | mA   |
| Maximum output voltage              | $V_{OM}$         |  | 3.6  | 4.0  |      | V    |
| Trans conductance                   | $g_m$            | $V_{IN} = \text{BIAS} \pm 0.2\text{V}$ | 1.3  | 1.5  | 1.7  | A/V  |
| <b>Sled motor driver/Pre OP-amp</b> |                  |  |      |      |      |      |
| Common mode input range             | $V_{ICM}$        |  | -0.3 |      | 11.0 | V    |
| Input bias current                  | $I_{BOP}$        |  |      | 30   | 300  | nA   |
| Low Level output voltage            | $V_{OLOP}$       |  |      | 0.1  | 0.3  | V    |
| Output source current               | $I_{SO}$         |  | 0.3  | 0.5  |      | mA   |
| Output sink current                 | $I_{ST}$         |  | 1    |      |      | mA   |
| <b>Sled motor driver</b>            |                  |  |      |      |      |      |
| Output offset voltage               | $V_{OOFLS}$      |  | -100 | 0    | 100  | mV   |
| Maximum output voltage              | $V_{OMLD}$       |  | 7.5  | 9.0  |      | V    |
| Closed loop voltage gain            | $G_{VSL}$        | $V_{IN} = \pm 0.2\text{V}$             | 18.0 | 20.0 | 22.0 | dB   |
| <b>Loading motor driver</b>         |                  |  |      |      |      |      |
| Output offset voltage               | $V_{OOFLD}$      |  | -50  | 0    | 50   | mV   |
| Maximum output voltage              | $V_{OMLD}$       |  | 3.6  | 4.0  |      | V    |
| Closed loop voltage gain            | $G_{VLD}$        | $V_{IN} = \text{BIAS} \pm 0.2\text{V}$ | 13.5 | 15.5 | 17.5 | dB   |
| Gain error by polarity              | $\Delta G_{VLD}$ | $V_{IN} = \text{BIAS} \pm 0.2\text{V}$ | 0    | 1    | 2    | dB   |

Note: This product is not designed for protection against radioactive rays.

## ■ POWER DISSIPATION/ELECTRICAL CHARACTERISTIC CURVES



\* On less than 3% (percentage occupied by copper foil),  
70 x 70 mm<sup>2</sup>, t=1.6mm glass epoxy mounting.

### SWITCH TABLE

| PARAMETER                  | SW | INPUT VOLTAGE |          |          |      |      | CONDITIONS                 | MEASURE POINT   |
|----------------------------|----|---------------|----------|----------|------|------|----------------------------|-----------------|
|                            |    | VIN1          | VIN2     | VIN3     | VIN4 | VST  |                            |                 |
| Quiescent current          | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 5.0V |                            | IQ              |
| Stand-by quiescent current | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 0.5V |                            | IQ              |
| Voltage for stand-by ON    | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 0.5V |                            | IQ              |
| Voltage for stand-by OFF   | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 2.0V |                            | IQ              |
| <b>Actuator driver</b>     |    |               |          |          |      |      |                            |                 |
| Output offset current      | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 5.0V |                            | V01/2           |
| Maximum output voltage     | 1  | 0V<br>5V      | 0V<br>5V | 2.5V     | 2.5V | 2.5V |                            | V01/2           |
| Trans conductance          | 1  | 2.3V          | 2.3V     | 2.5V     | 2.5V | 2.5V |                            | V01/2           |
|                            |    | 2.7V          | 2.7V     |          |      |      |                            |                 |
| <b>Send motor driver</b>   |    |               |          |          |      |      |                            |                 |
| Input bias current         | 2  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 5.0V |                            | VBOP/1M         |
| Low level output voltage   | 1  | 2.5V          | 2.5V     | 0V       | 2.5V | 5.0V |                            | VOOP            |
| Output source current      | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 5.0V | I <sub>LOOP</sub> = +0.2mA | VOOP            |
| Output sink current        | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 5.0V | I <sub>LOOP</sub> = -1mA   | VOOP            |
| Output offset voltage      | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 5.0V |                            | V <sub>O3</sub> |
| Maximum output voltage     | 1  | 2.5V          | 2.5V     | 0V<br>5V | 2.5V | 5.0V |                            | V <sub>O3</sub> |
| Closed loop voltage gain   | 1  | 2.5V          | 2.5V     | 2.3V     | 2.5V | 5.0V |                            | V <sub>O3</sub> |
|                            |    |               |          | 2.7V     |      |      |                            |                 |
| <b>Loading driver</b>      |    |               |          |          |      |      |                            |                 |
| Output offset voltage      | 1  | 2.5V          | 2.5V     | 2.5V     | 2.5V | 5.0V |                            | V <sub>O4</sub> |
| Maximum output voltage     | 1  | 2.5V          | 2.5V     | 2.5V     | 0V   | 5.0V |                            | V <sub>O4</sub> |
|                            |    |               |          |          | 5V   |      |                            |                 |
| Voltage Gain               | 1  | 2.5V          | 2.5V     | 2.5V     | 2.3V | 5.0V |                            | V <sub>O4</sub> |
|                            |    |               |          |          | 2.7V |      |                            |                 |

Notes on use:

1. Thermal-shut-down circuit built-in. In case IC chip temperature rise to 175°C (typ.), thermal-shut-down circuit operates and output current is muted. Next time IC chip temperature falls below 150°C (typ.), the driver blocks start.
2. In case stand-by –pin voltage under 0.5V or opened, quiescent current is muted. Stand-by-pin voltage should be over 2.0V for normal application.
3. In case supply voltage falls below 3.5V (typ.), output current is muted. Next time supply voltage rises to 3.7V (typ.), the driver blocks start.
4. Bias-pin (pin27) should be pulled up more than 1.2V, In case bias-pin voltage is pulled down under 0.9V (typ.), output current is muted.
5. Insert the by-pass capacitor between V<sub>cc</sub>-pin and GND-pin of IC as possible as near (approximately 0.1μF).
6. Heat dissipation fins are attached to the GND on the inside of the package, Make sure to connect these to the external GND.

<Supplement>

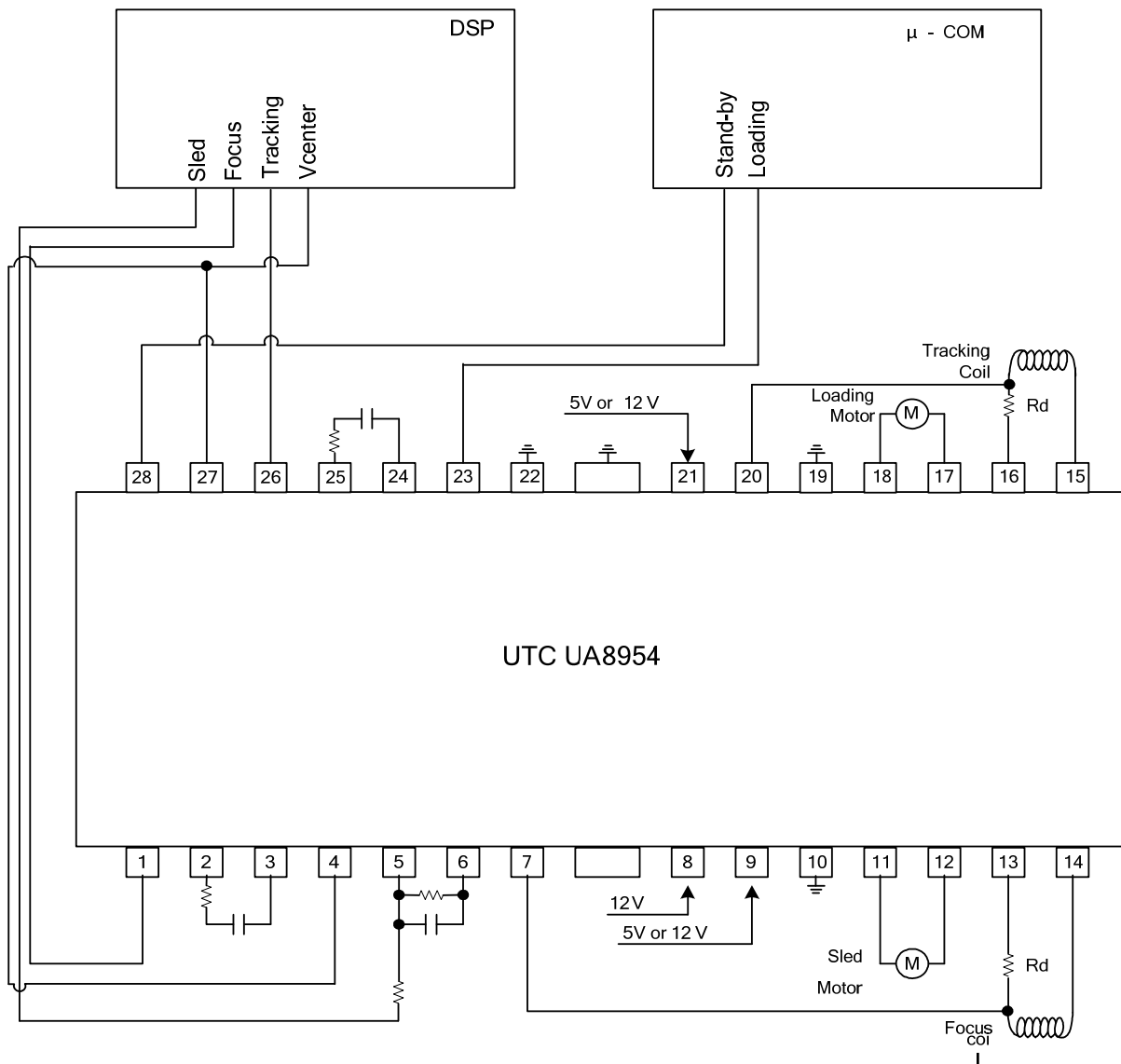
Current feedback driver

Trans conductance (output current /input voltage) is showed as follows.

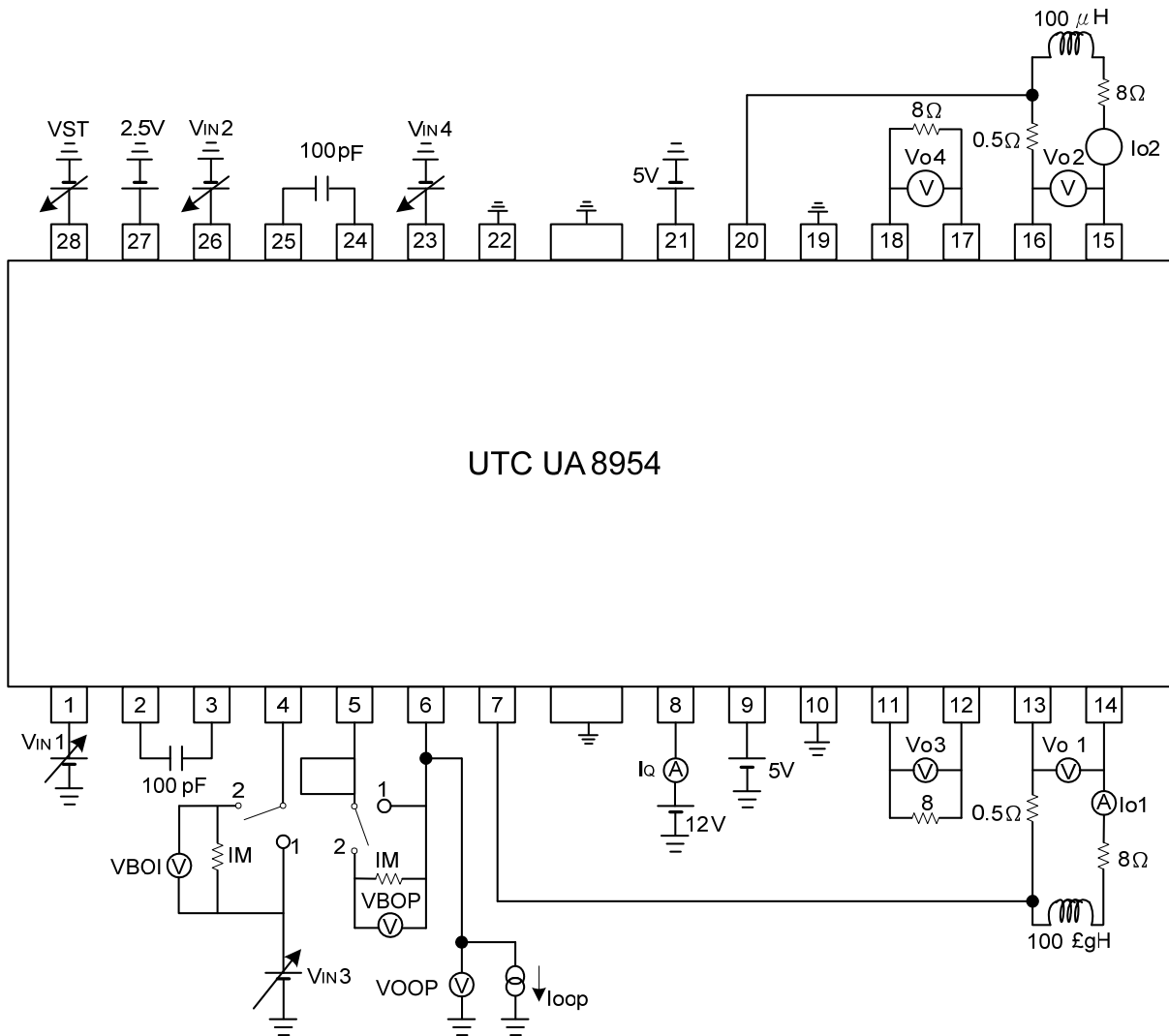
$$g_m = \frac{1}{R_d + R_{wire}} \text{ (A / V)}$$

R<sub>wire</sub>=0.15Ω (±0.05Ω): Au wire

## APPLICATION CIRCUIT



### ■ TEST CIRCUIT



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